

An Atlas of Seeds and Fruits from Macquarie Island

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Seeds and fruits of 30 members of the vascular flora from subantarctic Macquarie Island are described and illustrated. The atlas was constructed to aid in identification of fossils found in peat deposits on the island.

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INTRODUCTION

Macquarie Island, (158°57'E, 54°30'S) in the Southern Ocean, is one of a number of small isolated islands in the subantarctic zone. Like other subantarctic islands it has a small vascular flora (Greene and Walton, 1975). The island's flora consists of about 45 vascular plant species and 110 bryophyte species. Table 1 lists vascular species and includes all recent taxonomic revisions.

Climate during the Holocene has enabled extensive peat formations to develop on the island. Fossil evidence of past vegetation, in the form of pollen grains, spores, seeds, leaf and stem fragments, is preserved in these peat deposits. This atlas was constructed to aid in the identification of seeds and fruits found in peat samples. Analysis of the fossil record from peat deposits is providing valuable insight into vegetation dynamics and tectonic processes on the island (Selkirk *et al.*, 1983; Selkirk *et al.*, 1984; Bergstrom, 1985). The usefulness of macrofossil analysis, in association with microfossil analysis, in the reconstruction of past vegetation is becoming increasingly apparent (GreatRex, 1983; Griffin, 1977; Bergstrom, 1985; Huckerby and Oldfield, 1976; Campbell *et al.*, 1973). GreatRex (1983) reported that most seeds and fruit found in surface samples of mires in Britain came from within 1m of the sampling point. Seeds coming from greater distances were adapted for dispersal by wind or water. He suggested that reconstruction of past communities from assemblages in a single sample would apply only to the immediate vicinity of the sampling point.

There have been numerous comments in the literature on the stability of the morphology of seeds (Montgomery, 1977; Corner, 1976; Berggren, 1969), with the last two authors suggesting the value of the use of seed morphology as a tool in systematics.

METHODS

Collections

Seeds and fruits were collected from plants on Macquarie Island during the summers of 1979-80, 1983-84. The dry seeds and fruits are part of the Herbarium, School of Biological Sciences, Macquarie University, but will be lodged with the National Herbarium of New South Wales, Royal Botanic Gardens, Sydney, as voucher specimens. Of the 40 angiosperm species known from the island, 10 have not been collected with either seeds or fruits, or with mature seeds or fruit.

Form of Descriptions

All descriptions are for identification of seeds and fruits under a dissecting micro-

scope. They are for the smallest dispersal unit, be it a seed or indehiscent fruit such as an achene. On occasions when it was hard to determine whether seeds or fruit were dispersed, descriptions for both seed and fruit are given.

The descriptions are divided into a number of sections.

a) Dimensions

The position of the hilum or basal scar is taken as the base of the seed or fruit. The

TABLE 1

Extant Vascular Flora of Macquarie Island

Nomenclature after Copson (1984) and Seppelt *et al.* (1984) except where indicated

Lycopodiaceae —	<i>Lycopodium</i> sp.
Blechnaceae —	<i>Blechnum penna-marina</i>
Grammitidaceae —	<i>Grammitis poeppigiana</i>
Hymenophyllaceae —	<i>Hymenophyllum peltatum</i>
Aspidiaceae —	<i>Polystichum vestitum</i>
Apiaceae —	<i>Azorella selago</i> <i>Hydrocotyle</i> sp.
Araliaceae —	<i>Stilbocarpa polaris</i>
Asteraceae —	<i>Cotula plumosa</i> <i>Pleurophyllum hookeri</i>
Brassicaceae —	<i>Cardamine corymbosa</i>
Callitrichaceae —	<i>Callitriche antarctica</i>
Caryophyllaceae —	<i>Cerastium fontanum</i> <i>Colobanthus muscoides</i> <i>C. quitensis</i> <i>Stellaria decipiens</i> <i>S. media</i>
Crassulaceae —	<i>Crassula moschata</i>
Cyperaceae —	<i>Carex trifida</i> <i>Isolepis aucklandicus</i> (1) * <i>Uncinia divaricata</i> * <i>U. hookeri</i>
Haloragaceae —	<i>Myriophyllum triphyllum</i>
Juncaceae —	<i>Juncus scheuchzerioides</i> <i>Luzula crinita</i> var. <i>crinita</i> (2)
Onagraceae —	<i>Epilobium brunnescens</i> var. <i>brunnescens</i> (3) <i>E. pedunculare</i> (4)
Orchidaceae —	<i>Corybas macranthus</i>
Poaceae —	<i>Agrostis magellanica</i> <i>Anthoxanthum odoratum</i> <i>Deschampsia chapmanii</i> <i>D. penicillata</i> <i>Festuca contracta</i> <i>Poa annua</i> <i>P. foliosa</i> <i>P. hamiltonii</i> <i>P. litorosa</i> <i>Puccinellia macquariensis</i>
Polygonaceae —	<i>Rumex crispus</i>
Portulacaceae —	<i>Montia fontana</i>
Ranunculaceae —	<i>Ranunculus biternatus</i>
Rosaceae —	<i>Acaena magellanica</i> <i>A. minor</i>
Rubiaceae —	<i>Coprosma pumila</i> <i>Galium antarcticum</i>

(1) = *Scirpus aucklandicus* (Wilson, 1981); (2) = *Luzula campestris* (Edgar, 1975); (3) = *Epilobium nerteroides* (Raven and Raven, 1976); (4) = *Epilobium linnaeoides* (Raven and Raven, 1976).

* = specimens identified Karen Wilson (pers. comm., 1985).

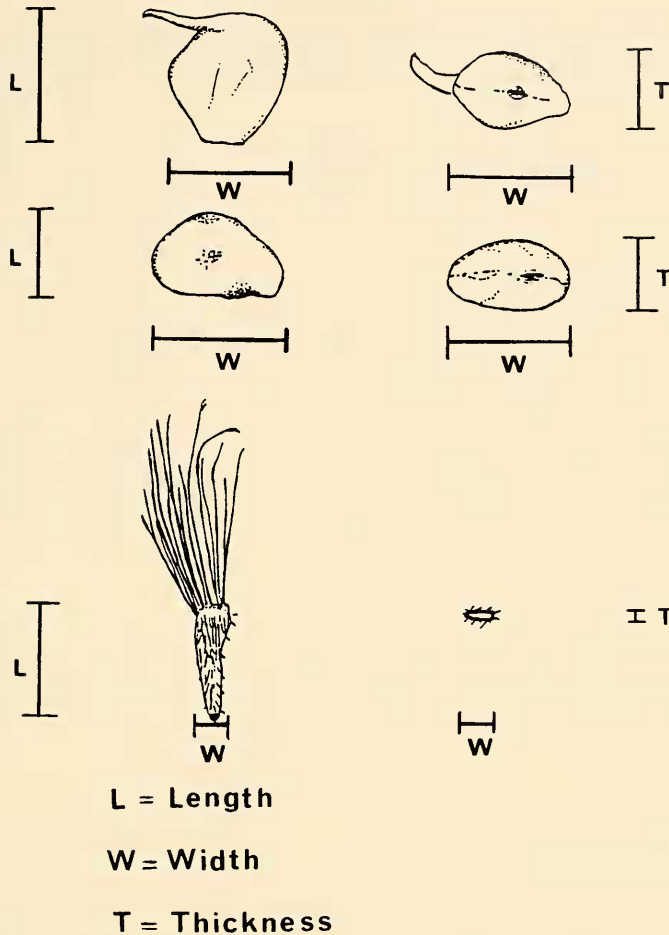


Fig. 1. Diagram illustrating how dimensions were determined. Three different seed/fruit types are shown.

length is measured from the base to the apex or, where a style is present, to the base of the style. The width is perpendicular to this and the thickness, perpendicular to the 2 axes. All measurements are taken at the widest point of the seeds or fruits. Fig. 1 shows how length, width and thickness measurements on three types of seeds and fruits were determined. The measurements given are the means of measurements on 10 seeds + standard error. The standard error by no means gives the range within the species, but Montgomery (1977) suggests that although seeds may vary in size, depending on growth conditions, the ratio of the measurements is usually constant. When 10 seeds were not available the number of seeds measured is given in the form of $n = x$, where x is the number measured.

b) Shape

The shape has been given in terms of longitudinal section (l.s.) and cross section (c.s.). These sections have been considered as simple symmetrical plane shapes. The shapes are delimited mathematically as ratios:

- in the case of l.s., length : width
- in the case of c.s., thickness : width.

	12:1	6:1	3:1	2:1	3:2	6:5	1:1	5:6	2:3	1:2	1:3	1:6	1:12
ELLIPTIC													
OBLONG													
RHOMBIC													
OVATE													
OBOVATE													
TRIANGULAR													
OBTRIANGULAR													

Language equivalents:**ELLIPTIC**

- 1-2 narrowly elliptic
 3-4 elliptic
 5 broadly elliptic
 6 circular
 7 transversely broadly elliptic
 8-9 transversely elliptic
 10-11 transversely narrowly elliptic

OBLONG

- 12 linear
 13-14 narrowly oblong
 15-16 oblong
 17 broadly oblong
 18 square
 19 transversely broadly oblong
 20-21 transversely oblong
 22-23 transversely narrowly oblong
 24 transversely linear

RHOMBIC

- 25-26 narrowly rhombic
 27-28 rhombic
 29 broadly rhombic
 30 quadrate rhombic
 31 transversely broadly rhombic
 32-33 transversely rhombic
 34-35 transversely narrowly rhombic

OVATE

- 36-37 narrowly ovate
 38-39 ovate
 40-41 broadly ovate
 41-42 very broadly ovate
 43-44 depressed ovate

OBOVATE

- 45-46 narrowly obovate
 47-48 obovate
 49-50 broadly obovate
 50-51 very broadly obovate
 52-53 depressed obovate

TRIANGULAR

- 72 linear triangular
 73-74 narrowly triangular
 75-76 triangular
 77-78 broadly triangular
 78-79 very broadly triangular
 80-81 shallowly triangular
 82-83 very shallowly triangular

OBTRIANGULAR

- 84 linear-obtriangular
 85-86 narrowly obtriangular
 87-88 obtriangular
 89-90 broadly obtriangular
 90-91 very broadly obtriangular
 92-93 shallowly obtriangular
 94-95 very shallowly obtriangular

Fig. 2. Chart of plane shapes and descriptive terminology (after Montgomery, 1977, after Systematics Association, 1962).

The numbers following the shape descriptions are serial numbers given by the Systematics Association Committee for Descriptive Biological Terminology (1962) to plane shapes, shown in Fig. 2.

c) **Comments**

Comments are self-explanatory. A glossary is provided at the end of the descriptions.

d) **Colour**

Colours of dry seeds and fruits were ascertained by use of the 'Revised Standard Soil Color Chart' by Oyana and Takehara (1967). This standard was chosen as it is widely available. The description method is based on a system in which colour can be measured by three attributes: **Hue** which represents the dominant spectral colour such as red or blue; **Value** — which represents the relative lightness of colour; **Chroma** — the relative purity of spectral colour. A serial number is given. Thus, Hue 7.5YR 6/8 consists first of the hue number (Hue 7.5YR), then the value number (6), followed by the chroma number (8). A description of the colour is also given (e.g. orange) based on terminology used by Oyana and Takehara (1967). All colours were assessed under the same natural light conditions.

PHOTOGRAPHS

The photographs (Figs 3-10) show seeds and fruits against a background of grey plasticine. The length-wise orientation of the figures has the hilum or fruit scar pointing towards the caption. Where possible seeds and fruits were positioned so that both the l.s. and c.s. could be viewed. The scale on each photograph indicates 1mm.

DESCRIPTIONS OF SEEDS AND FRUITS

APIACEAE

Azorella selago (Fig. 3A)

Length: 1.61 ± 0.04 mm

Width: 0.91 ± 0.05 mm

Thickness: 0.68 ± 0.06 mm

Shape: —

Longitudinal section: elliptic (3-4) or irregular.

Cross section: varied, due to distortion from other mericarps at the commissure.

Comments: Mericarps. Surface rough with 5 distinct irregular longitudinal ridges. Persistent style 1.48 ± 0.5 mm long. Floral remnant may be present.

Colour: Hue 10YR 7/6 bright yellow brown.

ARALIACEAE

Stilbocarpa polaris (Fig. 3B,D)

Length: 2.24 ± 0.03 mm

Width: 0.92 ± 0.05 mm

Thickness: 1.14 ± 0.05 mm

Shape: —

Longitudinal section: broadly ovate (41-42).

Cross section: transversely elliptic (8-9) or irregular.

Comments: Seeds borne in black, shiny, spherical fruit, centre of which is hollow. Seed surface coarse, often with fleshy endocarp still attached. No hilum. Cream, persistent Y-shaped vascular trace on one surface. In arms of 'Y' there is a hole.

Colour: Hue 7.5YR 4/6 brown.

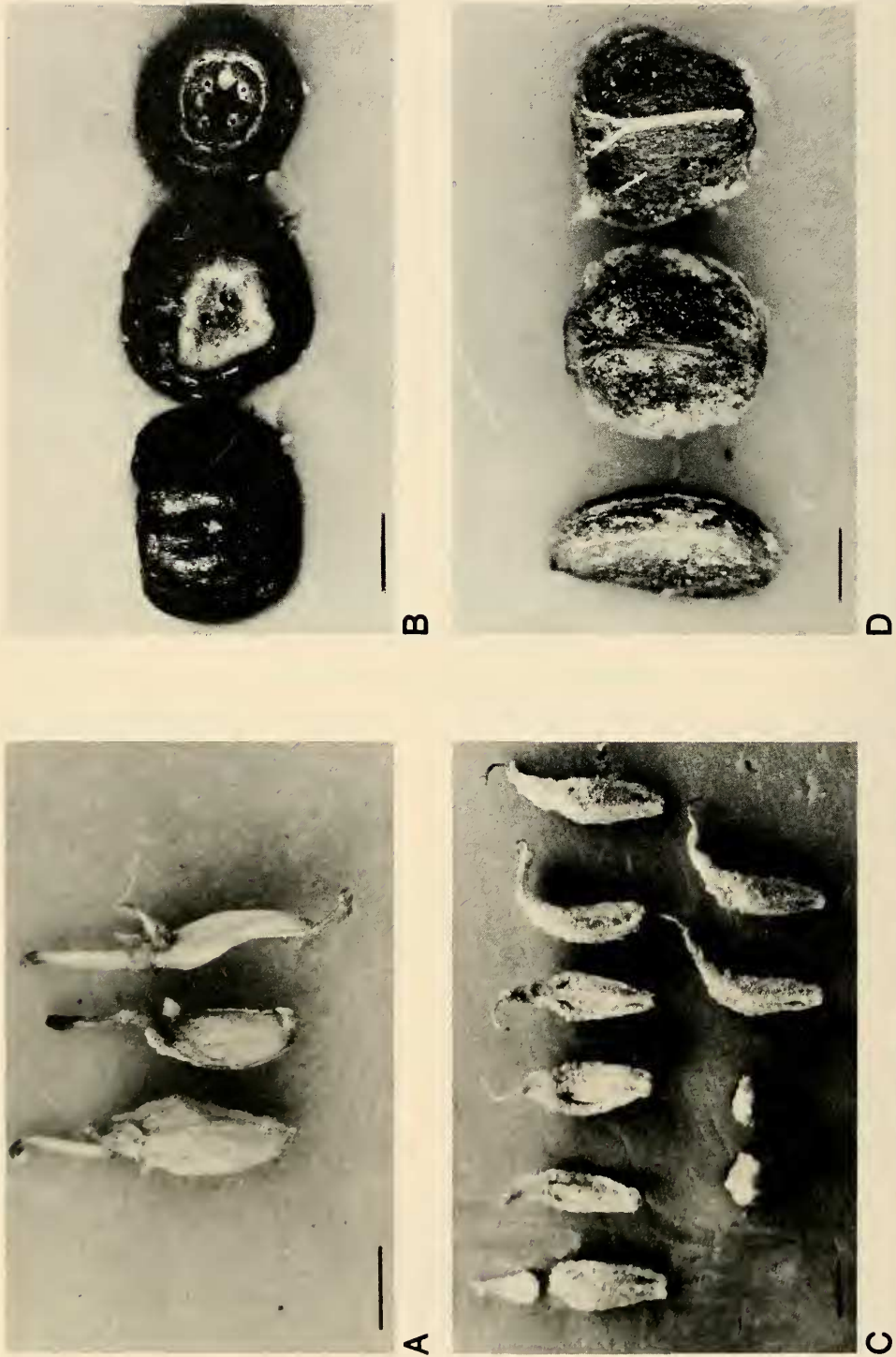


Fig. 3. A = *Azorella selago* mericarps. B & D = *Stilbocarpa polaris*, B = fruits, D = seeds, C = *Cotula plumosa* achenes. Imm scales.

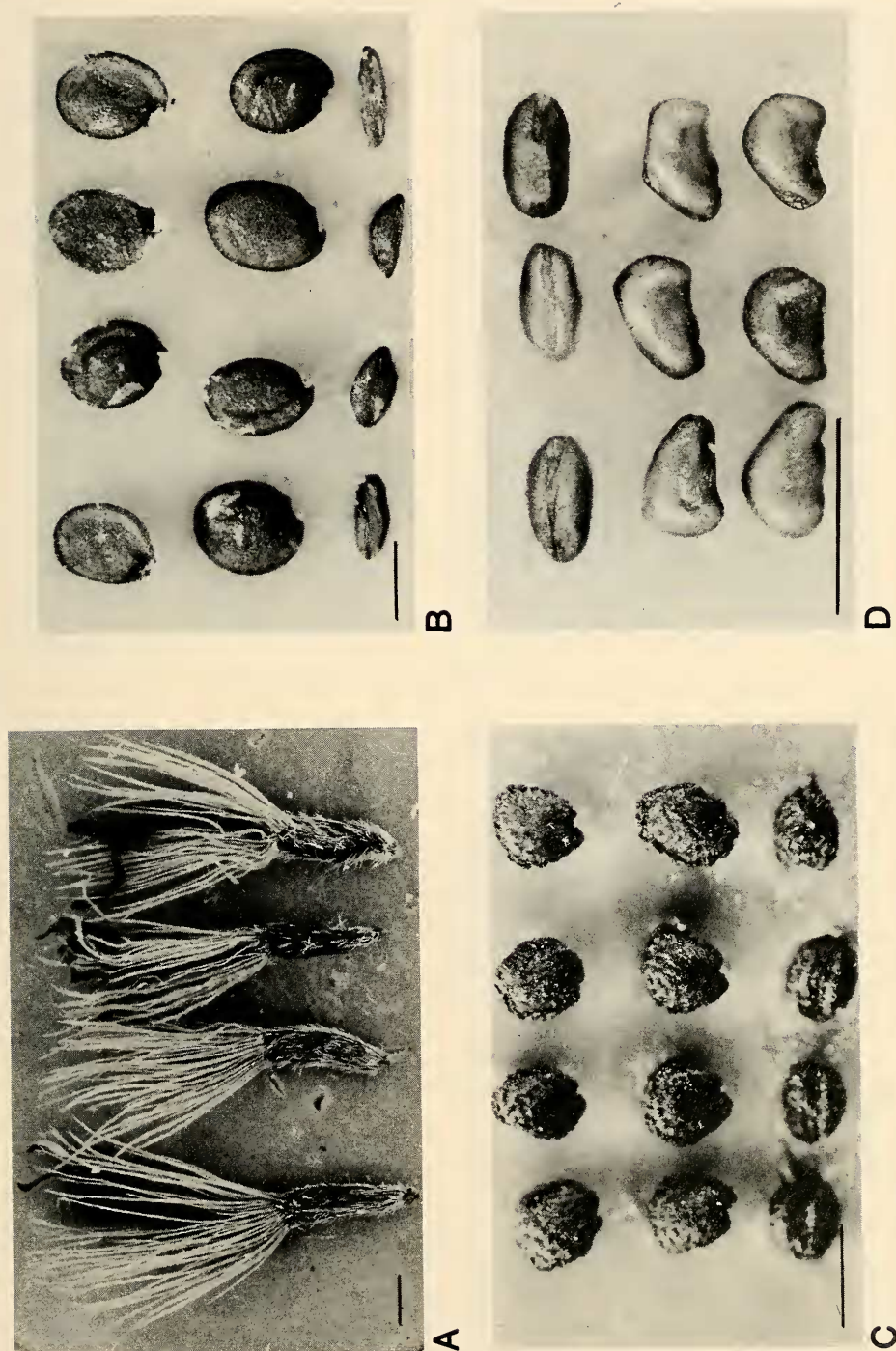


Fig. 4. A = *Pleurophyllum hookeri*, achenes. B = *Cerastium fontanum* seeds. C = *Cardamine corymbosa*, seeds. D = *Colobanthus muscoides* seeds. Imm scales.

ASTERACEAE

Cotula plumosa (Fig. 3C)

Length: 2.04 ± 0.04 mm

Width: 1.18 ± 0.03 mm

Thickness: 0.94 ± 0.03 mm

Shape: —

Longitudinal section: obovate (47).

Cross section: transversely elliptic (8).

Comments: Achene. Longitudinal axis curved. Surface of achene reticulate and coarsely punctate. Persistent style and tubular corolla.

Colour: Hue 10YR 7/4 dull yellow orange.

Pleurophyllum hookeri (Fig. 4A)

Length: 3.0 ± 0.14 mm

Width: 0.88 ± 0.05 mm

Thickness: 0.54 ± 0.02 mm

Shape: —

Longitudinal section: narrowly obovate (45-46) to triangular (85-86).

Cross section: transversely oblong (21).

Comments: Achene with plumose pappus. Surface of achene velutinous, hairs white. Styler and perianth remnants often present. Pappus hairs approximately 6 mm long, unequal in length and bristly.

Colour: Hue 2.5YR dull reddish brown.

BRASSICACEAE

Cardamine corymbosa (Fig. 4B)

Length: 1.3 ± 0.02 mm

Width: 1.0 ± 0.02 mm

Thickness: 0.4 ± 0.02 mm

Shape: —

Longitudinal section: elliptical to broadly elliptic (4-5).

Cross section: depressed ovate (44) or irregular.

Comments: Cotyledons accumbent with cotyledons and radicle indicated by a sulcus. Surface undulating, punctulate and shiny. In c.s. the seeds compressed at margins. Funicular remnant light yellow orange (Hue 10Y).

Colour: Hue 10R 5/8 red, margins and hilum darker.

CARYOPHYLLACEAE

Cerastium fontanum (Fig. 4C)

Length: 0.7 ± 0.15 mm

Width: 0.68 ± 0.01 mm

Thickness: 0.54 ± 0.01 mm

Shape: —

Longitudinal section: broadly obovate (49-50) or irregular.

Cross section: transversely oblong (19-20).

Comments: Hilum within deep notch. Surface coarsely papillate. Papillae low and rounded with ovoid stellate bases. Arrangement of papillae may be concentric, particularly along margins. Small, hyaline, protoxylem remnant attached to hilum.

Colour: Hue 5YR 5/8 bright reddish brown.

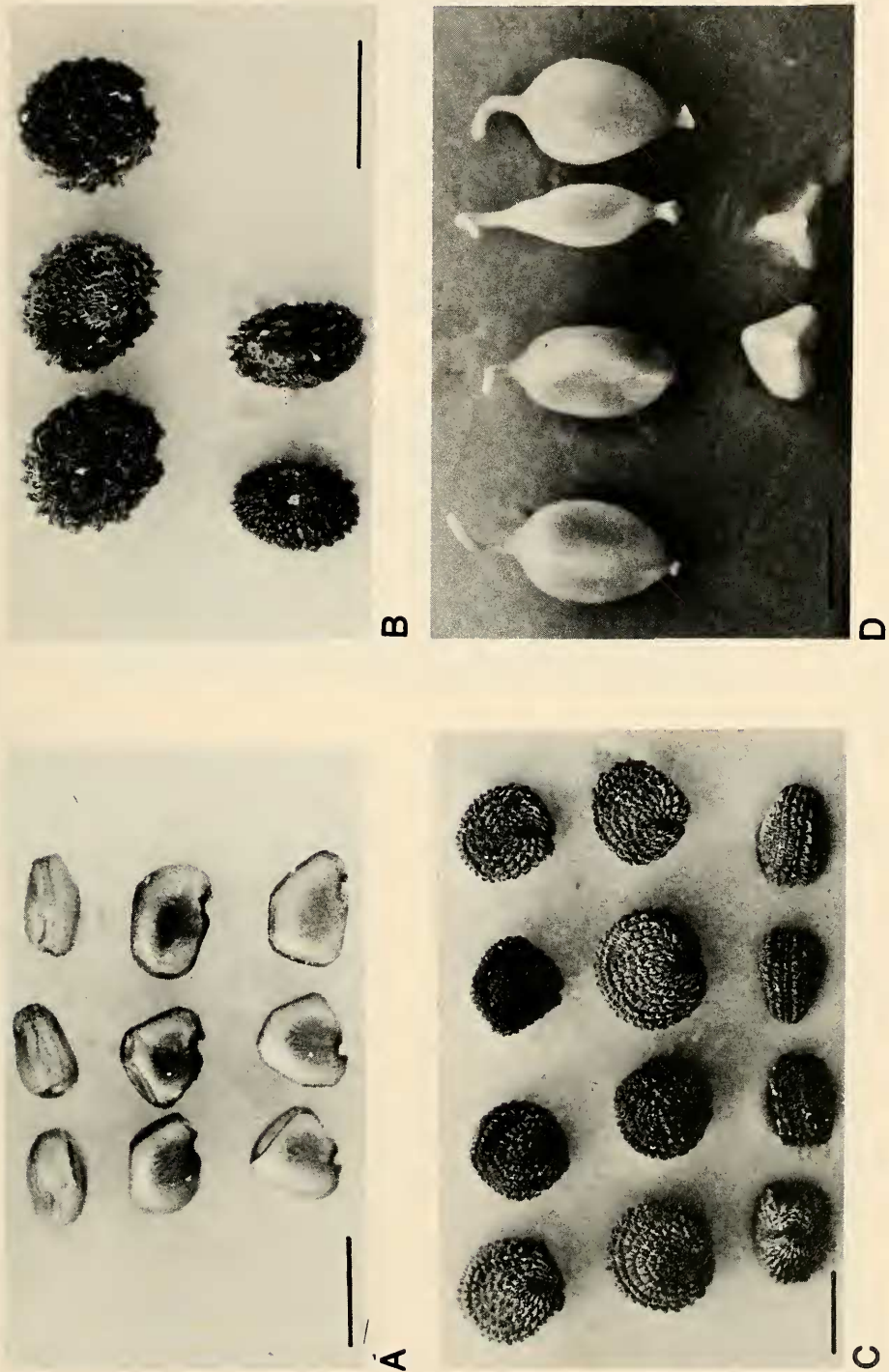


Fig. 5. A = *Colobanthus quitensis* seeds. B = *Stellaria decipiens* seeds. C = *Stellaria media* seeds. D = *Carex trifida* achenes. 1mm scales.

Colobanthus muscoides (Fig. 4D)Length: $0.38 \pm 0.002\text{mm}$ Width: $0.65 \pm 0.002\text{mm}$ Thickness: $0.34 \pm 0.002\text{mm}$

Shape: —

Longitudinal section: depressed ovate (43-44) or irregular.

Cross section: transversely elliptic (8-9) or irregular.

Comments: Seeds slightly reniform. Margins often depressed forming sulcus (hence irregular in l.s.). Surface faintly colliculate and translucent. Minute white caruncle.

Colour: Hue 7.5YR 5/8 bright brown.

Colobanthus quitensis (Fig. 5A)Length: $0.55 \pm 0.02\text{mm}$ Width: $0.62 \pm 0.02\text{mm}$ Thickness: $0.38 \pm 0.01\text{mm}$

Shape: —

Longitudinal section: depressed obovate (52-53), or irregular.

Cross section: transversely elliptic (8-9).

Comments: Margins often depressed forming sulcus (hence irregular in l.s.). Surface translucent and very faintly colliculate. Minute white caruncle.

Colour: Hue 5YR 5/8 bright reddish brown.

Stellaria decipiens (Fig. 5B)Length: $0.98 \pm 0.05\text{mm}$ n = 7Width: $0.97 \pm 0.05\text{mm}$ n = 7Thickness: $0.64 \pm 0.05\text{mm}$ n = 7

Shape: —

Longitudinal section: circular (6) to irregular.

Cross section: transversely elliptic (8-9).

Comments: Hilum in deep notch. Concentric to irregular papillose surface. Papillae irregular and elongate, especially along margin and towards the hilum/base.

Colour: Hue 7.5R 4/8, 3/4, 3/6 red to dark red.

Stellaria media (Fig. 5C)Length: $1.25 \pm 0.04\text{mm}$ Width: $1.26 \pm 0.04\text{mm}$ Thickness: $0.8 \pm 0.01\text{mm}$

Shape: —

Longitudinal section: broadly elliptic (5-7) or broadly obovate (48-51) or irregular.

Cross section: transversely elliptic (8-9), or oblong (20-21) or irregular.

Comments: Hilum in deep notch. Concentric rings of low rounded papillae on surface. Papillae arise from raised irregular or star-shaped bases.

Colour: Hue 7.5R 4/8 red.

CYPERACEAE

Carex trifida (Fig. 5D)Length: $1.79 \pm 0.02\text{mm}$ n = 6Width: $1.05 \pm 0.06\text{mm}$ n = 6Thickness: $0.85 \pm 0.06\text{mm}$ n = 6

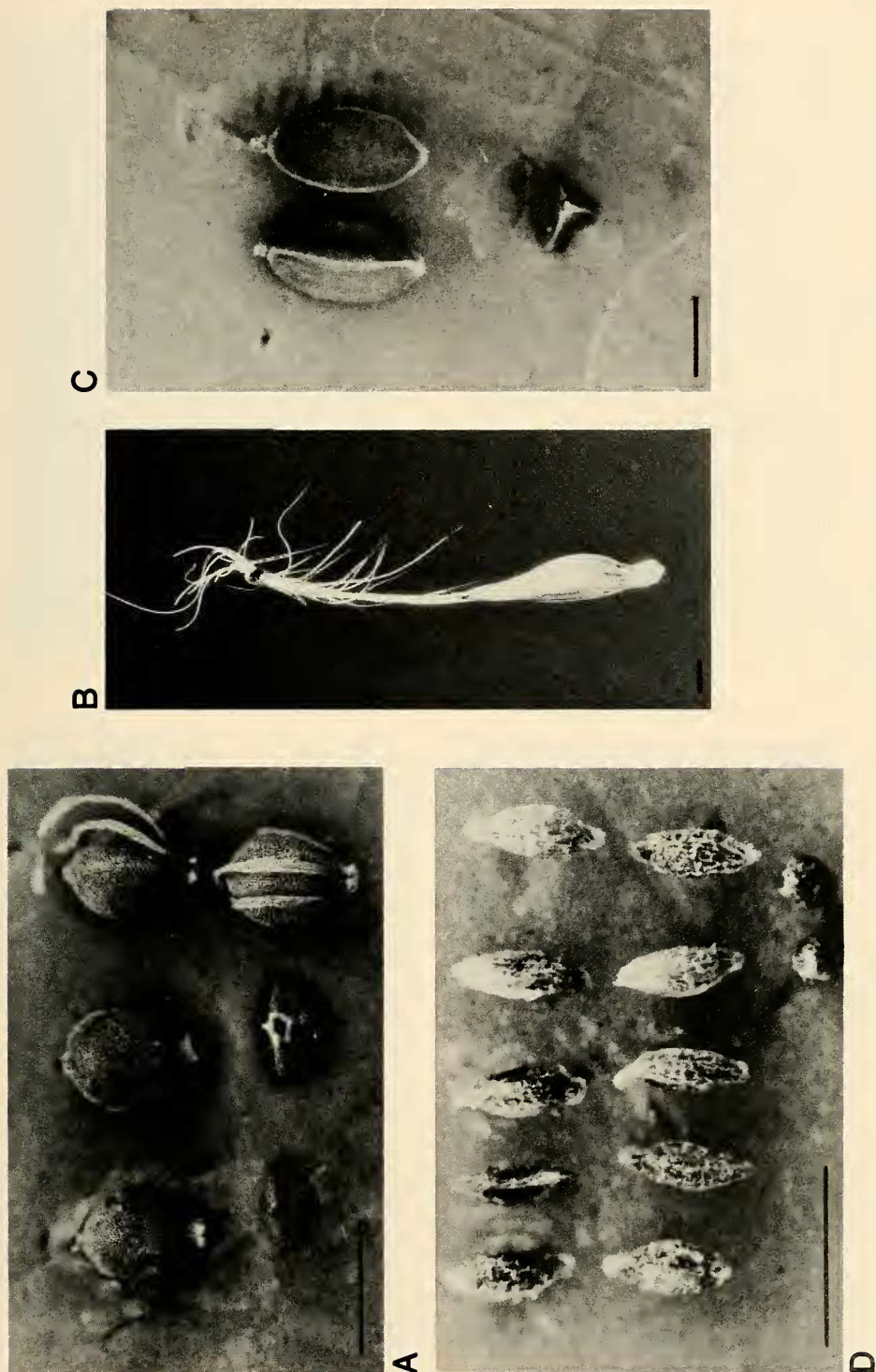


Fig. 6. A = *Isolepis aucklandicus* seeds. B & C = *Uncinia divaricata*, B = perigynium, C = achenes. D = *Juncus scheuchzerioides* seeds. 1mm scales.

Shape: —

Longitudinal section: elliptic (3-4).

Cross section: triangular to shallowly triangular (80-82).

Comments: Achene. Longitudinal axis concave-convex. Surface punctulate and lustrous. Persistent, slender and contorted stylar remnant or just stylar base present. Fruit borne in papery perigynium which is ovate in l.s., transversely elliptic in c.s. (approximately 0.5mm long), somewhat fusiform with stipitate base.

Colour: Hue 10YR 8/6-8/8 yellow-orange.

Isolepis aucklandicus (Fig. 6A)

Length: 1.01 ± 0.01 mm

Width: 0.73 ± 0.01 mm

Thickness: 0.45 ± 0.01 mm

Shape: —

Longitudinal section: broadly obovate (49-50).

Cross section: shallowly triangular (81-82), tending to planoconvex.

Comments: Margins slightly ridged, base stipitate. Surface areolate. Stylar base obtuse. Three loose, ligulate bristles from base, approximately 2× longer than achene.

Colour: Hue 7.5YR 4/6 brown.

Uncinia divaricata (Fig. 6B,C)

Length: 2.43 ± 0.02 mm

Width: 1.21 ± 0.04 mm

Thickness: 0.79 ± 0.04 mm

Shape: —

Longitudinal section: elliptic (3).

Cross section: shallowly triangular (80).

Comments: Achene. Sides slightly convex, edges rounded. Surface with profuse, low, rounded papillae. Achene borne in perigynium. Stylar remnant that, if intact, protrudes from perigynium and terminates in a hook. Surface of perigynium striated.

Colour: Hue 5YR 6/6-6/8 orange.

JUNCACEAE

Juncus scheuchzerioides (Fig. 6D)

Length: 0.7 ± 0.01 mm

Width: 0.25 ± 0.01 mm

Thickness: 0.25 ± 0.01 mm

Shape: —

Longitudinal section: elliptic (3).

Cross section: circular (6) or irregular.

Comments: Seed fusiform. Coarsely striate, whitish membranous coating on surface. There is often a prominent longitudinal ridge of tissue. Base is usually nodulous or sometimes minutely pointed.

Colour: Hue 5YR 5/8-6/8 bright reddish-brown to orange.

Luzula crinita var. *crinita* (Fig. 7A)

Length: 1.03 ± 0.01 mm

Width: 0.53 ± 0.01 mm

Thickness: 0.43 ± 0.01 mm

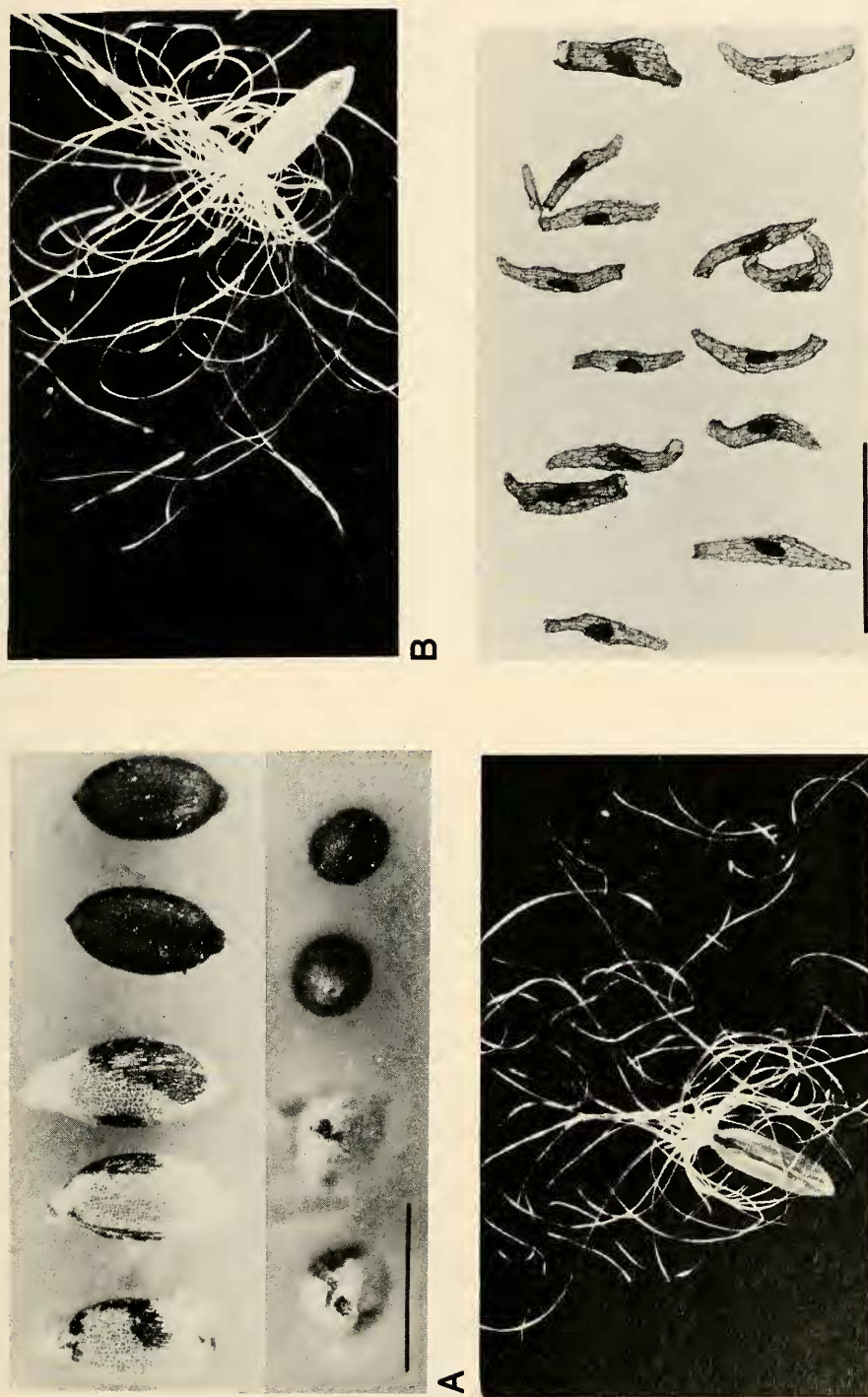


Fig. 7. A = *Luzula crinita* var. *crinita* seeds. B = *Epilobium brunnescens* var. *brunnescens* seeds. C = *Epilobium pedunculare* seeds. D = *Corybas macranthus* seeds. Imm scales.

Shape: —

Longitudinal section: elliptic (3).

Cross section: very broadly ovate (41-42).

Comments: Seed fusiform with minutely pointed apex and obtuse nodulous base, hilum inconspicuous. A large ($1.26 \pm 0.01\text{mm}$, $n=10$) whitish aril completely envelops the seed. Surface of seed reticulate and glistening. Surface of caruncle faintly striated and areolate.

Colour: Hue 7.5R 3/4-3/6 dark red, base darker.

ONAGRACEAE

Epilobium brunnescens var. *brunnescens* (Fig. 7B)

Length: $0.81 \pm 0.01\text{mm}$

Width: $0.62 \pm 0.01\text{mm}$

Thickness: $0.2 \pm 0.01\text{mm}$

Shape: —

Longitudinal section: narrowly obovate to obovate (46-47).

Cross section: transversely oblong (20-21).

Comments: Sides often depressed. Longitudinal sulcus, deepening towards apex, terminating with cream coma. Surface longitudinally papillose.

Colour: Hue 5YR 6/8 orange.

Epilobium pedunculare (Fig. 7C)

Length: $0.70 \pm 0.01\text{mm}$

Width: $0.29 \pm 0.01\text{mm}$

Thickness: $0.21 \pm 0.04\text{mm}$

Shape: —

Longitudinal section: narrowly obovate (46-47).

Cross section: transversely oblong (20-21).

Comments: Sides often depressed. Surface longitudinally papillose. Longitudinal sulcus, deepening towards apex, and terminating with cream coma. Base minutely pointed.

Colour: Hue 5YR 6/8 orange.

ORCHIDACEAE

Corybas macranthus (Fig. 7D)

Length: $0.67 \pm 0.03\text{mm}$

Width: $0.12 \pm 0.01\text{mm}$

Thickness: approx. 0.1mm

Shape: —

Longitudinal section: elliptic (1) or irregular (e.g. twisted).

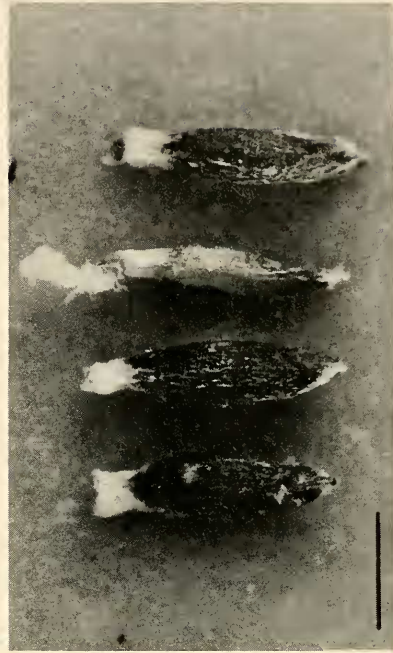
Cross section: circular (6) or irregular.

Comments: Small spherical embryo in transparent membranous reticulate seed coat. Base tapering or blunt.

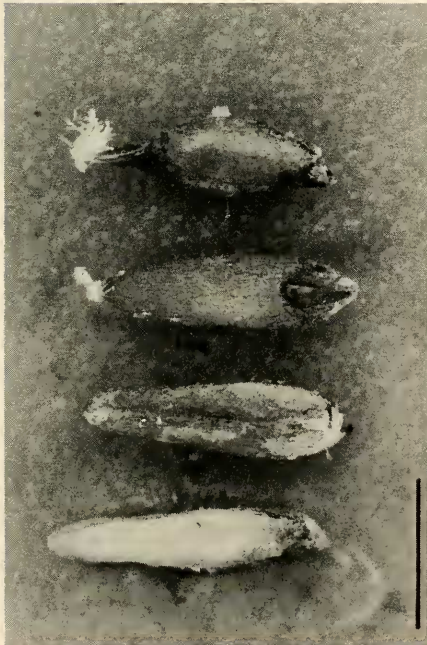
Colour: Hue 10YR 8/3 light yellow-orange.



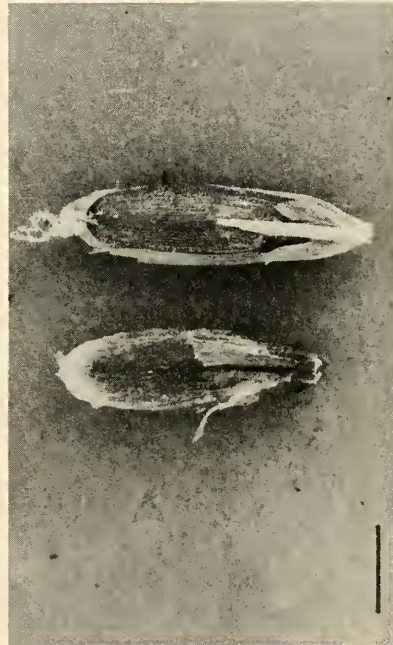
A



B



C



D

Fig. 8. **A** = *Agrostis magellanica* caryopsis. **B** = *Deschampsia chapmanii* caryopsis. **C** = *Festuca contracta* caryopsis. **D** = *Poa annua* caryopsis. 1mm scales.

POACEAE

Agrostis magellanica (Fig. 8A)Length: 1.5 ± 0.01 mm n=7Width: 0.52 ± 0.03 mm n=7Thickness: 0.42 ± 0.02 mm n=7

Shape: —

Longitudinal section: narrowly elliptic (2-3).

Cross section: broadly elliptic (5).

Comments: Caryopsis. Apex minutely pointed. Small coma present. V-shaped groove near fruit scar. Surface sometimes concave.

Colour: Hue 7.5YR 7/8 yellow-orange.

Deschampsia chapmanii (Fig. 8B)Length: 1.02 ± 0.03 mmWidth: 0.47 ± 0.02 mmThickness: 0.45 ± 0.01 mm

Shape: —

Longitudinal section: obovate (47).

Cross section: circular (6).

Comments: Caryopsis fusiform. Nodulous apex terminating in small coma. Apiculate base with lacerate fruit scar. Surface rugose.

Colour: Hue 7.5YR 5/8.

Festuca contracta (Fig. 8C)Length: 3.19 ± 0.01 mm n=2Width: 1.16 ± 0 n=2Thickness: 0.58 ± 0.04 mm n=2

Shape: —

Longitudinal section: narrowly obovate (46).

Cross section: depressed obovate (43).

Comments: Caryopsis. Base minutely pointed, oblique fruit scar. Apex obtuse with exocarpe extending into wing. Dark stripe on concave surface. Surface rugulose.

Colour: Hue 7.5YR 5/8 bright brown.

Poa annua (Fig. 8D)Length: 1.48 ± 0.06 mm n=5Width: 0.57 ± 0.02 mm n=5Thickness: 0.38 ± 0.02 mm n=5

Shape: —

Longitudinal section: narrowly elliptic (2-3).

Cross section: irregular.

Comments: Caryopsis. Base blunt, apex terminating in a short white coma. Surface rugose.

Colour: Hue 10YR 6/8.

Poa foliosa (Fig. 9A)Length: 1.9 ± 0.02 mmWidth: 0.44 ± 0.01 mmThickness: 0.43 ± 0.01 mm

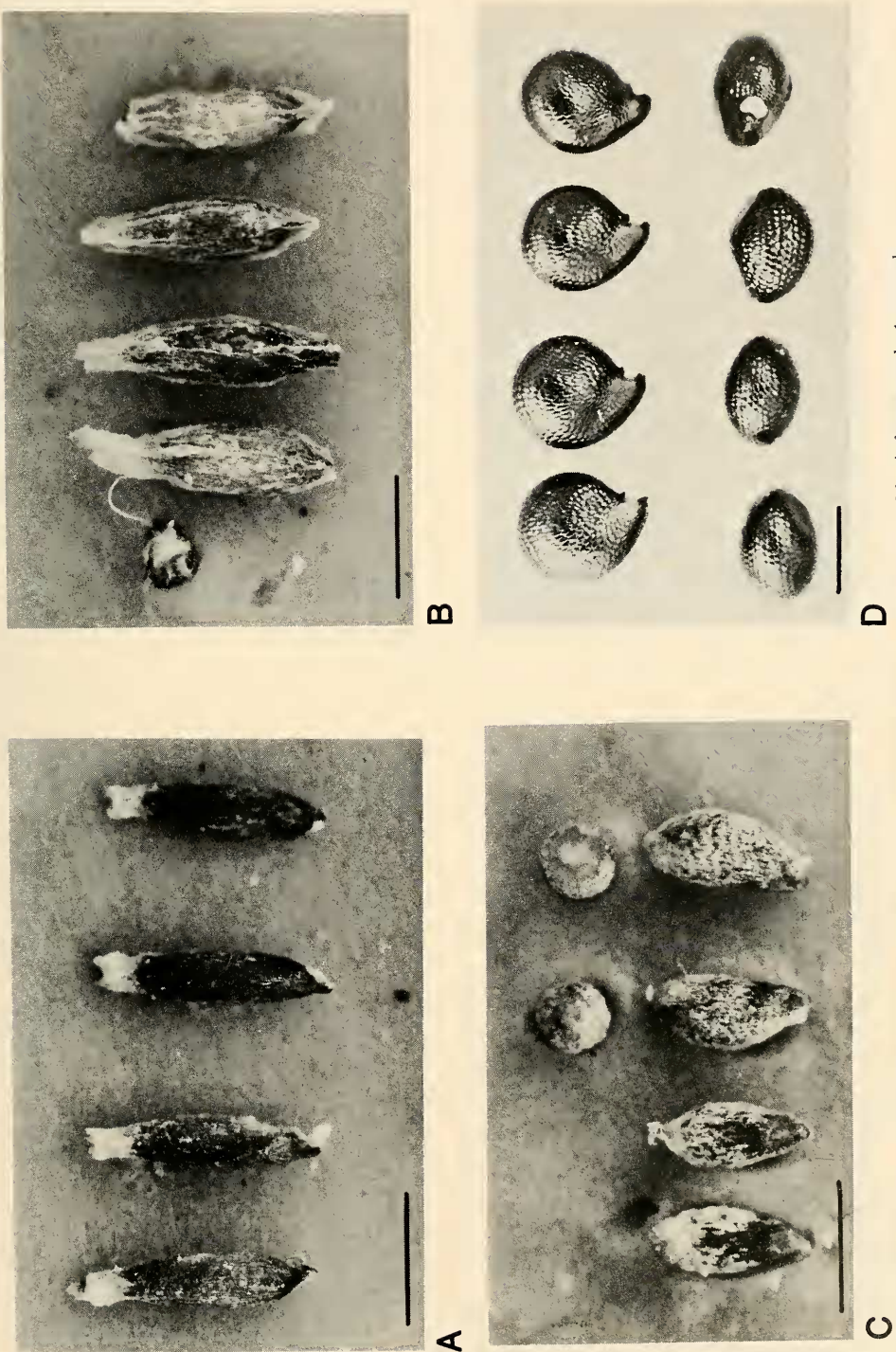


Fig. 9. A = *Poa foliosa* caryopsis. B = *Poa hamiltonii* caryopsis. C = *Puccinellia macquariensis* caryopsis. D = *Montia fontana* seeds. Imm scales.

Shape: —

Longitudinal section: narrowly elliptic (1-2).

Cross section: broadly triangular (78).

Comments: Caryopsis. Sides often concave. Apex minutely pointed. Fruit-scar white, rough surfaced and blunt. Surface translucent and rugulose.

Colour: Hue 7.5YR 5/8 bright brown.

Poa hamiltonii (Fig. 9B)

Length: 1.94 ± 0.06 mm

Width: 0.56 ± 0.01 mm

Thickness: 0.53 ± 0.02 mm

Shape: —

Longitudinal section: narrowly elliptic (1-2).

Cross section: circular (6) or irregular.

Comments: Caryopsis. Exocarp extending beyond rest of fruit by approximately 0.5mm and terminating in small white coma at apex.

Colour: Hue 7.5YR 5/8 bright brown.

Puccinellia macquariensis (Fig. 9C)

Length: 1.67 ± 0.04 mm

Width: 0.56 ± 0.02 mm

Thickness: 0.47 ± 0.02 mm

Shape: —

Longitudinal section: narrowly elliptic to elliptic (2-3).

Cross section: broadly elliptic to circular (4-6).

Comments: Caryopsis fusiform, apex minutely pointed. Seed coat forming cream fruit-scar at base. Surface rugose.

Colour: Hue 2.5YR 4/8 reddish brown.

PORTULACACEAE

Montia fontana (Fig. 9D)

Length: 1.5 ± 0.22 mm

Width: 1.2 ± 0.01 mm

Thickness: 0.9 ± 0.01 mm

Shape: —

Longitudinal section: obovate to broadly obovate (48-49).

Cross section: transversely elliptic (8).

Comments: Embryo coiled. Compressed, keeled edge ascending from hilum. Surface colliculose with regular, tending to concentric pattern. Very shiny (lustrous). Obvious pale yellow caruncle (Hue 2.5Y 8/4) with areolate surface.

Colour: Hue 5RP 1.7/1 purplish black.

RANUNCULACEAE

Ranunculus biternatus (Fig. 10A)

Length: 1.9 ± 0.03 mm

Width: 1.8 ± 0.04 mm

Thickness: 1.3 ± 0.02 mm

Shape: —

Longitudinal section: very broadly ovate (41-42).

Cross section: broadly ovate (40-41).

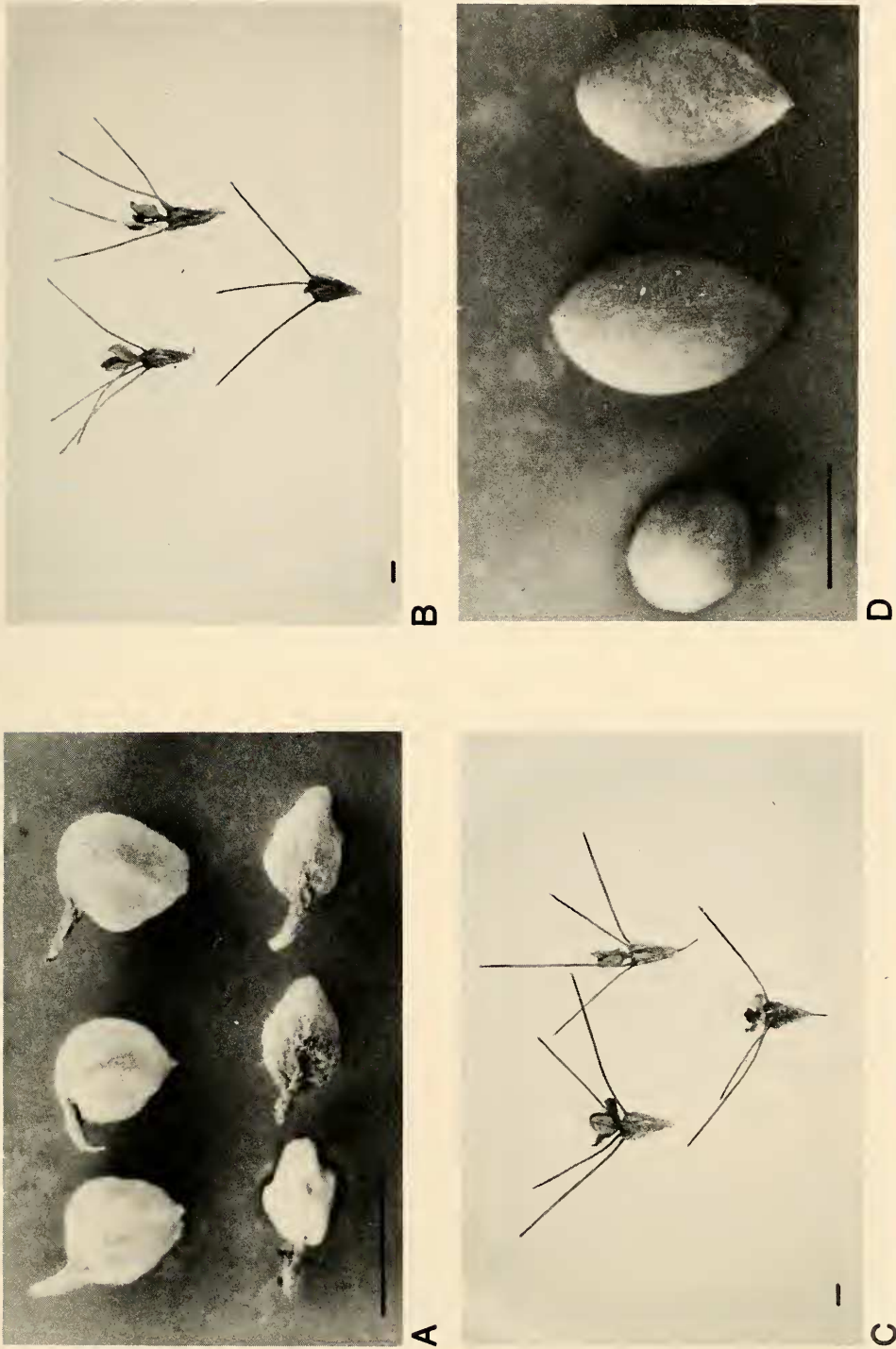


Fig. 10. A = *Ranunculus bitematus* achene. B = *Acaena magellanica* achene. C = *Acaena minor* achenes. D = *Coprosma pumila* seeds. 1mm scales.

Comments: Achene. Deep sulcus ascending from hilum and fruit scar to base of lateral persistent style. Style often recurved with terminal hook. Surface irregular and rugose. Colour: Hue 10YR 8/1.2-8/4 light grey to light yellow-orange. Apex and style darker.

ROSACEAE

Acaena magellanica (Fig. 10B)

Length: 3.1 ± 0.06 mm

Width: 1.11 ± 0.03 mm

Thickness: 1.11 ± 0.03 mm

Shape: —

Longitudinal section: obtriangular (87).

Cross section: broadly oblong to square (17-18).

Comments: Achene enclosed in hardened villous calyx (hairs white) which is endowed with 4 subulate spines approximately 8mm long. Spines barbed at tip. Corolla and stylar remnant, or at least persistent stylar base, present.

Colour: 2.5Y 7/6 bright yellowish brown.

Acaena minor (Fig. 10C)

Length: 3.16 ± 0.1 mm

Width: 1.1 ± 0.03 mm

Thickness: 1.0 ± 0.03 mm

Shape: —

Longitudinal section: obtriangular (87).

Cross section: broadly oblong to square (17-18).

Comments: Achene enclosed in hardened villous calyx (hairs white) which is endowed with 4 subulate spines approximately 6mm long. Spines barbed at tip. Corolla and stylar remnant, or at least persistent stylar base, present.

Colour: Hue 7.5YR 6/8 orange.

RUBIACEAE

Coprosma pumila (Fig. 10D)

Length: 2.5 ± 0.1 mm

Width: 1.58 ± 0.03 mm

Thickness: 1.3 ± 0.01 mm

Shape: —

Longitudinal section: obovate (48).

Cross section: broadly elliptic (5).

Comments: Seed fusiform. Longitudinal axis curved. The base is minutely pointed with hilum inconspicuous. Surface rugulose.

Colour: Hue 10YR 7/6 bright yellow brown.

GLOSSARY

Accumbent Lying face to face

Achene A dry, indehiscent, one-seeded fruit

Areolate Having a distinct but fine network of spaces

Aril An appendage or outer covering of a seed, growing from hilum or funiculus

Bristle A stiff hair

Caruncle An aril at or about the hilum or funiculus

Colliculate Covered with small, rounded elevations, or hillocks

Coma A tuft of hairs covering apex

- Commissure** A junction or seam
Fruit Scar Scar on fruit indicating point of attachment to parent plant
Fusiform Swollen in the middle and tapering towards the ends
Funiculus Stalk by which a seed is attached to ovary wall or placenta
Hilum Scar on a seed indicating point of attachment to funiculus
Indehiscent Not opening
Ligulate Strap-shaped
Mericarp 1-seeded portion of fruit which may/may not split at maturity
Nodulous With small knobs
Papillate Small, nipple-shaped projections
Perigynium Sheath which envelops achenes belonging to the Cyperaceae
Punctate Marked with dots or depressions
Puncticulate Finely punctate
Reticulate Netted, more distinct than areolate
Rugose Coarsely wrinkled
Rugulose With very fine wrinkles
Stellate Star-like
Stipitate With a short stalk
Sulcus A groove or furrow
Velutinous Having fine straight hairs
Villous Having long silky hairs

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